	Application No.	Applicant(s)
Notice of Allowability	10/092,994	DOUCEUR ET AL.
	Examiner	Art Unit
	Cam Y T. Truong	2162

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *10/25/2005.*

2. ☒ The allowed claim(s) is/are *1-4,6-9,11,19-24,26,27,31-38,42,43 and 45.*

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some*   c)☐ None of the:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a)☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

      1)☐ hereto or 2)☐ to Paper No./Mail Date _____ .

    (b)☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date <u>10/25/05 & 5/12/05</u>, 10|13|05, 1|3||05.

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

1.   Applicant has amended claims 1 and 36 in the amendment filed on

10/25/2005.   Claims 1-48 are pending in this office action.

Drawings

2.   Drawing filed on 3/7/2005 is accepted.

Information Disclosure Statement

3.   Information Disclosure Statement (IDS) filed on 10/13/05, 1/31/05,

10/25/05 and 5/12/2005 are considered.

EXAMINER'S AMENDMENT

4.   An examiner's amendment to the record appears below. Should the

changes and/or additions be unacceptable to applicant, an amendment may be

filed as provided by 37 CFR 1.312. To ensure consideration of such an

amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone

interview with Attorney Allan T. Sponseller, Reg.No. 38,318 on 11/7/2005.

Please replace claims 1-2, 4, 6-8, 11, 19, 20, 26-27, 31, 33, 36, 38, 42,

43, and 45 with claims 1-2, 4, 6-8, 11, 19, 20, 26-27, 31, 33, 36, 38, 42, 43, and

45.

Please cancel claims 5, 10, 12-18, 25, 28-30, 39-41, 44, and 46-48.

1. (Currently amended) A computer implemented method for determining location to store object replicas, the method comprising:

receiving an indication of a homeless replica of an object, wherein the object has a plurality of replicas including the homeless replica, wherein the object is a file;

determining an initial placement for the homeless replica, wherein the initial placement is one of a plurality of devices in a system;

evaluating, on an object by object basis, whether any replicas of a first object can be swapped with one of a plurality of replicas of a second object and not reduce a combined object availability of the first and second objects, wherein the first object is selected as one of a plurality of objects managed by a first computing device having a lowest object availability, and the second object is selected as one of another plurality of objects managed by a second computing device having a highest file availability, wherein the evaluating comprises:

determining, for each possible swapping of replicas of the objects, an object availability for each object; and

checking whether any of the possible swappings result in the combined object availability of the first and second objects that is greater than a combined object availability; and

swapping a replica of the first object with the one of the plurality of replicas of the second object only if the swapping does not reduce the combined object availability of the first and second objects, wherein the swapping results in

increasing an availability of the first object and decreasing an availability of the
second object.

2. (Currently amended) A method as recited in claim 1, wherein the replica of
the first object is stored on the first computing device, wherein the one of the
plurality of replicas of the second object is stored on the second computing
device, and wherein swapping the replicas comprises moving the replica of the
first object to the second computing device and moving the one of the plurality of
replicas of the second object to the first computing device.

4. (Currently amended) A method as recited in claim 1, wherein both the first
object and the second object have a same amount of replicas.

6. (Currently amended) A method as recited in claim 1, wherein the object
represents a plurality of files.

7. (Currently amended) A method as recited in claim 1, wherein the object
represents a portion of a file.

8. (Currently amended) A method as recited in claim 1, wherein the object
represents a directory.

11. (Currently amended) A method as recited in claim 1, wherein combined object availability is not reduced if the availability of the first object and the availability of the second object are no further from one another than they were prior to the evaluating.

19. (Currently amended) One or more computer readable media having stored thereon a plurality of instructions that, when executed by one or more processors of a computing device for determining location to store file replicas, causes the one or more processors to perform acts comprising:

receiving an indication of a homeless replica of a file, wherein the file has a plurality of replicas including the homeless replica;

determining an initial placement for the homeless replica, on one of a plurality of additional computing devices;

working, in conjunction with one or more other processors of another computing device, to determine whether a replica of a first file managed by a first computing device and a replica of a second file managed by a second computing device can be swapped with one another to bring an availability of the first file and an availability of the second file closer, wherein the first file is selected as one of a plurality of files managed by the first computing device having a lowest file availability, and the second file is selected as one of another plurality of files managed by the second computing device having a highest file availability;

evaluating, on a file by file basis, whether any replicas of the first file can be swapped with one of a plurality of replicas of the second file and not reduce a

combined file availability of the first and second files, wherein the evaluating
comprises:

>determining, for each possible swapping of replicas of the files, a file availability for each file;

>checking whether any of the possible swappings result in the combined file availability of the first and second files that is greater than a combined file availability; and

>swapping the replica of the first file and the replica of the second file only

if the swapping brings the availability of the first file and the availability of the
second file closer, wherein the swapping results in increasing the availability of
the first file and decreasing the availability of the second file.

20. (Currently amended) One or more computer readable media as recited in
claim 19, wherein the swapping comprises communicating with a first device on
which the replica of the first file is stored and a second device on which the
replica of the second file is stored to have the first device transfer the replica of
the first file to the second device and delete the replica of the first file on the first
device, and to have the second device transfer the replica of the second file to
the first device and delete the replica of the second file on the second device.

26. (Currently amended) One or more computer readable media as recited in
claim 19, wherein determining the initial placement comprises randomly selecting
the initial placement for the homeless replica.

27. (Currently amended) One or more computer readable media as recited in claim 19, wherein the plurality of additional computing devices exclude any computing device on which a replica of the file is already stored.

31. (Currently amended) One or more computer readable media as recited in claim 19, wherein the first computing device is part of a directory group that is collectively responsible for managing a plurality of files including the first file, and wherein the second computing device is part of another directory group that is collectively responsible for managing another plurality of files including the second file.

33. (Currently amended) A computer implemented serverless distributed file system for determining location to store file replicas comprising:

a first plurality of computing devices storing files;

a second plurality of computing devices managing storage of the files;

wherein a first computing device of the second plurality of computing devices selects a first file for which it manages storage and communicates with a second computing device of the second plurality of computing devices to determine whether a replica of the first file and a replica of a second file for which the second computing device manages storage can be swapped in order to not reduce a combined file availability of the first and second files, wherein the first file is selected as one of a plurality of files managed by the first computing device

having a lowest file availability, and second file is selected as one of another plurality of files managed by the second computing device having a highest file availability;

wherein at least one of the second plurality of computing devices determines, for each possible swapping of replicas of the files, a file availability for each file, and checks whether any of the possible swappings result in the combined file availability of the first and second files that is greater than a combined file availability; and

if the replicas can be swapped to not reduce the combined file availability of the first and second files, then instructing one of the first plurality of computing devices on which the replica of the first file is stored to transfer the replica of the first file to one of the first plurality of computing devices on which the replica of the second file is stored, instructing the one of the first plurality of computing devices on which the replica of the second file is stored to transfer the replica of the second file to the one of the first plurality of computing devices on which the replica of the first file is stored, and

wherein the transfer of the replica of the first file to the one of the first plurality of computing devices on which the replica of the second file is stored and the transfer of the replica of the second file to the one of the first plurality of computing devices on which the replica of the first file is stored results in increasing an availability of the first file and decreasing an availability of the second file.

36. (Currently amended) One or more computer readable media having stored

thereon a plurality of instructions that is executed by one or more processors of a

computing device for determining location to store file replicas, causing the one

or more processors to:

receive an indication of a homeless replicas of a file;

initially place the homeless replicas of the file on different ones of a

plurality of devices using a first process; and

subsequently improve placement of replicas of a plurality of files by:

evaluating, on a file by file basis, whether any replicas of a first file can be

swapped with any replicas of a second file without a reduction in a combined file

availability of the first and second files, wherein the first file is selected as one of

a plurality of files managed by a first computing device having a lowest file

availability, and the second file is selected as one of another plurality of files

managed by a second computing device having a highest file availability, wherein

the evaluating comprises:

determining, for each possible swapping of replicas of the files, a file

availability for each file; and

checking whether any of the possible swappings result in the combined

file availability of the first and second files that is greater than a combined file

availability; and

swapping a replica of the first file with a replica of the second file if the

swapping results in no reduction in the combined file availability of the first and

second files, wherein the swapping results in increasing an availability of the first

file and decreasing an availability of the second file.

38. (Currently amended) One or more computer readable media as recited in

claim 36, wherein swapping the replica of the first file with the replica of the

second file comprises communicating with a first device on which the replica of

the first file is stored and a second device on which the replica of the second file

is stored to have the first device transfer the replica of the first file to the second

device and delete the replica of the first file on the first device, and to have the

second device transfer the replica of the second file to the first device and delete

the replica of the second file on the second device.

42. (Currently amended) A computer implemented method in a directory group

for determining location to store file replicas, the method comprising:

selecting other directory group to participate with in a replica placement

process;

selecting a first file maintained by the directory group;

determining whether exchanging a replica of the first file with a replica of a

second file maintained by the other directory group increases a combined file

availability of the first and second files, wherein the first file is selected as one of

a plurality of files managed by the directory group having a lowest file availability,

and the second file is selected as one of another plurality of files managed by the

other directory group having a highest file availability;

evaluating, on a file by file basis, whether any replicas of the first file can be

swapped with one of a plurality of replicas of the second file and not reduce the

combined file availability of the first and second files, wherein the evaluating

comprises:

determining, for each possible swapping of replicas of the files, a file

availability for each file; and

checking whether any of the possible swappings result in the combined file

availability of the first and second files that is greater than a combined file

availability; and

having the replica of the first file and the replica of the second file

exchanged if exchanging the replicas increases the combined file availability of

the first and second files, wherein the exchange results in increasing an

availability of the first file and decreasing an availability of the second file.

43. (Currently amended) A method as recited in claim 42, further comprising:

receiving, at the directory group, an indication of a homeless replica of the

first file; and

selecting, as a computing device on which to store the homeless replica,

one of a plurality of computing devices on which no other replica of the first file is

already stored.

45. (Currently amended) A method as recited in claim 42, wherein having the replica of the first file and the replica of the second file exchanged comprises communicating with a first device on which the replica of the first file is stored and a second device on which the replica of the second file is stored to have the first device transfer the replica of the first file to the second device and delete the replica of the first file on the first device, and to have the second device transfer the replica of the second file to the first device and delete the replica of the second file on the second device.

Allowable Subject Matter

5.   Claims 1-4, 6-9, 11, 19-24, 26, 27, 31-38, 42, 43 and 45 are allowed.

The prior art of record, alone or in combination, does not teach or fairly suggest

the combination of steps as recited in independent claim 1 wherein "evaluating,

on an object by object basis, whether any replicas of a first object can be

swapped with one of a plurality of replicas of a second object and not reduce a

combined object availability of the first and second objects; checking whether any

of the possible swappings result in the combined object availability of the first and

second objects that is greater than a combined object availability; and wherein

the swapping results in increasing an availability of the first object and

decreasing an availability of the second object";

The prior art of record, alone or in combination, does not teach or fairly

suggest the combination of steps as recited in independent claim 19 "to

determine whether a replica of a first file managed by a first computing device

and a replica of a second file managed by a second computing device can be

swapped with one another to bring an availability of the first file and an

availability of the second file closer; checking whether any of the possible

swappings result in the combined file availability of the first and second files that

is greater than a combined file availability; and wherein the exchange results in

increasing an availability of the first file and decreasing an availability of the

second file";

The prior art of record, alone or in combination, does not teach or fairly suggest the combination of steps as recited in independent claim 33 "to determine whether a replica of the first file and a replica of a second file for which the second computing device manages storage can be swapped in order to not reduce a combined file availability of the first and second files; checks whether any of the possible swappings result in the combined file availability of the first and second files that is greater than a combined file availability; and results in increasing an availability of the first file and decreasing an availability of the second file";

The prior art of record, alone or in combination, does not teach or fairly suggest the combination of steps as recited in independent claim 36 "evaluating, on a file by file basis, whether any replicas of a first file can be swapped with any replicas of a second file without a reduction in the combined file availability of the first and second files; checking whether any of the possible swappings result in the combined file availability of the first and second files that is greater than a combined file availability; and wherein the exchange results in increasing an availability of the first file and decreasing an availability of the second file"; and

The prior art of record, alone or in combination, does not teach or fairly suggest the combination of steps as recited in independent claim 42 "evaluating, on a file by file basis, whether any replicas of the first file can be swapped with one of a plurality of replicas of the second file and not reduce a combined file availability of the first and second files; checking whether any of the possible swappings result in the combined file availability of the first and second files that

is greater than a combined file availability; and wherein the exchange results in

increasing an availability of the first file and decreasing an availability of the
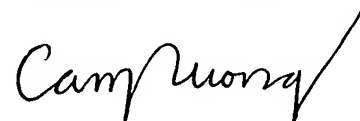
second file".

The dependent claims, bring definite, further limiting, and fully enabled by

the specification are also allowed.

Contact Information

6.   Any inquiry concerning this communication or earlier communications from

the examiner should be directed to Cam Y T. Truong whose telephone number is

(571) 272-4042. The examiner can normally be reached on Monday to Firday.

If attempts to reach the examiner by telephone are unsuccessful, the

examiner's supervisor, John Breene can be reached on (571) 272-4107. The fax

phone number for the organization where this application or proceeding is

assigned is 571-273-8300.

Information regarding the status of an application may be obtained from

the Patent Application Information Retrieval (PAIR) system. Status information

for published applications may be obtained from either Private PAIR or Public

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direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-

free).

Cam Y T Truong
Examiner
Art Unit 2162
11/8/2005